and Tables 9 and 10 above.

A three-dimensional (3-D) simulation model was used to simulate an in situ conversion process for a tar sand formation. A heat injection rate was calculated using a separate numerical code (CFX). The heat injection rate was calculated at 500 watts per foot (1640 watts per meter). The 3-D simulation was based on a dilation-recompaction model for tar sands. A target zone thickness of 50 meters was used. Input data for the simulation were as follows:

Depth of target zone = 280 meters;
Thickness = 50 meters;
Porosity = 0.27;
Oil saturation = 0.84;
Water saturation = 0.16;
Permeability = 1000 millidarcy;
Vertical permeability versus horizontal permeability = 0.1;
Overburden = shale; and
Base rock = wet carbonate.

Six component fluids were used based on fluids found in Athabasca tar sands. The six component fluids were: heavy fluid; light fluid; gas; water; pre-char; and char. The spacing between wells was set at 9.1 meters on a triangular pattern. Eleven horizontal heaters with a 300 m heater length were used with heat outputs set at the previously calculated value of 1640 watts per meter.

In The Claims:

Please cancel claims 1-530, 611-622, 626-664, 707-744, and 785-5395 without prejudice.

Listed below is a clean copy of amended claims. A marked-up copy indicating the
amended sections of the claims is provided in an accompanying document.

Please amend the claims as follows:

559. (Amended) The method of claim 531, wherein a partial pressure of H_2 is measured when
the mixture is at a production well.

599. (Amended) The method of claim 570, wherein a partial pressure of H_2 is measured when
the mixture is at a production well.

666. (Amended) The method of claim 665, wherein the hydrocarbons having carbon numbers
greater than 25 of the produced mixture is controlled to be less than about 20 % by weight, and
wherein the equation is:

$$p = e^{[-16000/T + 28]}.$$

667. (Amended) The method of claim 665, wherein the hydrocarbons having carbon numbers
greater than 25 of the produced mixture is controlled to be less than about 15 % by weight, and
wherein the equation is:

$$p = e^{[-18000/T + 32]}.$$

668. (Amended) The method of claim 665, wherein the one or more heat sources comprise at
least two heat sources, and wherein superposition of heat from at least the two heat sources
pyrolyzes at least some hydrocarbons within the selected section of the formation.

669.   (Amended) The method of claim 665, wherein the one or more heat sources comprise electrical heaters.

670.   (Amended) The method of claim 665, wherein the one or more heat sources comprise surface burners.

671.   (Amended) The method of claim 665, wherein the one or more heat sources comprise flameless distributed combustors.

672.   (Amended) The method of claim 665, wherein the one or more heat sources comprise natural distributed combustors.

673.   (Amended) The method of claim 665, further comprising controlling a temperature within at least a majority of the selected section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

675.   (Amended) The method of claim 665, further comprising controlling the heat such that an average heating rate of the selected section is less than about 1 °C per day during pyrolysis.

676.   (Amended) The method of claim 665, wherein providing heat from the one or more heat sources to at least the portion of formation comprises:

heating a selected volume (V) of the hydrocarbon containing formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day provided to the volume is equal to or less than Pwr, wherein Pwr is calculated by the equation:

$$Pwr = h*V*C_v*\rho_B$$

wherein *Pwr* is the heating energy/day, *h* is an average heating rate of the formation, ρ_B is formation bulk density, and wherein the heating rate is less than about 10 °C/day.

677. (Amended) The method of claim 665, wherein allowing the heat to transfer comprises transferring heat substantially by conduction.

678. (Amended) The method of claim 665, wherein providing heat from the one or more heat sources comprises heating the selected section such that a thermal conductivity of at least a portion of the selected section is greater than about 0.5 W/(m °C).

679. (Amended) The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons having an API gravity of at least about 25°.

680. (Amended) The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 0.1 % by weight to about 15 % by weight of the condensable hydrocarbons are olefins.

681. (Amended) The method of claim 665, wherein the produced mixture comprises non-condensable hydrocarbons, and wherein a molar ratio of ethene to ethane in the non-condensable hydrocarbons ranges from about 0.001 to about 0.15.

682. (Amended) The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is nitrogen.

683. (Amended) The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is oxygen.

684. (Amended) The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 1 % by weight, when calculated on an atomic basis, of the condensable hydrocarbons is sulfur.

685. (Amended) The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons comprise oxygen containing compounds, and wherein the oxygen containing compounds comprise phenols.

686. (Amended) The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein greater than about 20 % by weight of the condensable hydrocarbons are aromatic compounds.

687. (Amended) The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 5 % by weight of the condensable hydrocarbons comprises multi-ring aromatics with more than two rings.

688. (Amended) The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein less than about 0.3 % by weight of the condensable hydrocarbons are asphaltenes.

689.　(Amended)　The method of claim 665, wherein the produced mixture comprises condensable hydrocarbons, and wherein about 5 % by weight to about 30 % by weight of the condensable hydrocarbons are cycloalkanes.

690.　(Amended)　The method of claim 665, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen, wherein the hydrogen is greater than about 10 % by volume of the non-condensable component, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component.

691.　(Amended)　The method of claim 665, wherein the produced mixture comprises ammonia, and wherein greater than about 0.05 % by weight of the produced mixture is ammonia.

692.　(Amended)　The method of claim 665, wherein the produced mixture comprises ammonia, and wherein the ammonia is used to produce fertilizer.

693.　(Amended)　The method of claim 665, further comprising controlling formation conditions to produce a mixture of condensable hydrocarbons and H_2, wherein a partial pressure of H_2 within the mixture is greater than about 0.5 bar.

694.　(Amended)　The method of claim 665, wherein a partial pressure of H_2 is measured when the mixture is at a production well.

695.　(Amended)　The method of claim 665, further comprising altering a pressure within the formation to inhibit production of hydrocarbons from the formation having carbon numbers greater than about 25.

696. (Amended) The method of claim 665, further comprising:

providing hydrogen (H₂) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

697. (Amended) The method of claim 665, wherein the produced mixture comprises hydrogen and condensable hydrocarbons, the method further comprising hydrogenating a portion of the produced condensable hydrocarbons with at least a portion of the produced hydrogen.

698. (Amended) The method of claim 665, wherein allowing the heat to transfer comprises increasing a permeability of a majority of the selected section to greater than about 100 millidarcy.

699. (Amended) The method of claim 665, wherein allowing the heat to transfer comprises substantially uniformly increasing a permeability of a majority of the selected section.

700. (Amended) The method of claim 665, further comprising controlling the heat to yield greater than about 60 % by weight of condensable hydrocarbons, as measured by the Fischer Assay.

701. (Amended) The method of claim 665, wherein producing the mixture comprises producing the mixture in a production well, and wherein at least about 7 heat sources are disposed in the formation for each production well.

702. (Amended) The method of claim 665, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources

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are located in the formation in a unit of heat sources, and wherein the unit of heat sources comprises a triangular pattern.

703. (Amended) The method of claim 665, further comprising providing heat from three or more heat sources to at least a portion of the formation, wherein three or more of the heat sources are located in the formation in a unit of heat sources, wherein the unit of heat sources comprises a triangular pattern, and wherein a plurality of the units are repeated over an area of the formation to form a repetitive pattern of units.

774. (Amended) The method of claim 745, wherein a partial pressure of H_2 is measured when the mixture is at a production well.

Please add the following claims:

5396. (New) The method of claim 567, wherein at least about 20 heat sources are disposed in the formation for each production well.
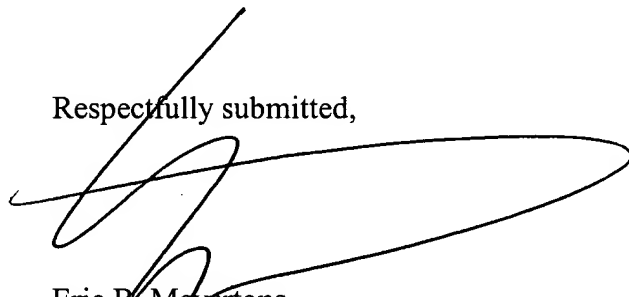
5397. (New) The method of claim 607, wherein at least about 20 heat sources are disposed in the formation for each production well.

5398. (New) The method of claim 701, wherein at least about 20 heat sources are disposed in the formation for each production well.

5399. (New) The method of claim 782, wherein at least about 20 heat sources are disposed in the formation for each production well.

If any fees are inadvertently omitted or if any additional fees are required or have been overpaid, please appropriately charge or credit those fees to Conley, Rose & Tayon, P.C. Deposit Account Number 501505/5659-08100/EBM.

Respectfully submitted,

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